CLAIMS AMENDMENTS:

Please amend Claims 14 and 15, and add new Claims 21-32 as follows:

1. (Previously Presented) A displacement detection apparatus comprising:

a light beam illuminating system that converts a linearly polarized light beam emitted from a light emitting element into a substantially parallel light beam;

a light beam splitting optical system that splits the parallel light beam emerging from said light beam illuminating system into a plurality of polarized light beams having different polarized states;

a focusing optical system that focuses the plurality of split light beams to different positions which are spatially separated from one another on a surface of a relatively moving object;

a polarizing prism that splits reflected light beams from the relatively moving object on the basis of a difference between the plurality of directions of polarization, wherein said reflected light beams are matched by said light beam splitting optical system;

a plurality of light receiving optical systems that individually detect the different polarized light beams split by said polarizing prism and output light receiving signals of the respective light beams; and

a comparator that compares light receiving signal levels of the respective light beams to detect a relative displacement of the relatively moving object.

2. (Original) An apparatus according to Claim 1, wherein said light beam splitting optical system has an optical performance capable of splitting the light beam emerging from said light emitting element and, at positions where the light beams are

focused by said focusing optical system, spatially separating the focusing positions of the focused light beams.

3. (Original) An apparatus according to Claim 2, wherein the surface of the relatively moving object is substantially vertically irradiated with the plurality of focused light beams.

4. (Original) An apparatus according to Claim 1, wherein a slit-shaped marking or a three-dimensional marking is formed on the surface of the relatively moving object to generate a reflectance difference.

5. (Original) An apparatus according to Claim 4, wherein said light beam splitting optical system has an optical characteristic with which the focusing positions of the plurality of focused light beams are spatially separated at an interval almost equal to a width of the marking.

6. (Original) An apparatus according to Claim 1, wherein said light beam splitting optical system has a parallel plate shape.

7. (Cancelled).

8. (Previously Presented) An apparatus according to Claim 1, wherein said light beam splitting optical system is a crystal optical element.

9. (Previously Presented) An apparatus according to Claim 1, wherein a boundary portion is formed on the surface of the relatively moving object to generate a reflectance difference.

10. (Previously Presented) A magnetic recording apparatus comprising:

a displacement detection apparatus comprising:

a light beam illuminating system that converts a linearly polarized light beam emitted from a light emitting element into a substantially parallel light beam;

a light beam splitting optical system that splits the single parallel light beam emerging from said light beam illuminating system into a plurality of polarized light beams having different polarized states;

a focusing optical system that focuses the plurality of split light beams to different positions which are spatially separated from one another on a surface of a relatively moving object;

a polarizing prism that splits reflected light beams from the relatively moving object on the basis of a difference between the plurality of directions of polarization, wherein said reflected light beams are matched by said light beam splitting optical system;

a plurality of light receiving optical systems that individually detect the different polarized light beams split by said polarizing prism and output light receiving signals of the respective light beams; and

a comparator that compares light receiving signal levels of the respective light beams to detect a relative displacement of the relatively moving object,

wherein a slit-shaped marking or a three-dimensional marking is formed on the surface of the relatively moving object to generate a reflectance difference;

a head arm having the marking or reflectance boundary portion formed on an upper surface;

a rotary positioner having said displacement detection apparatus on a rotary arm; and

a head arm drive motor control unit that controls a current of a head arm drive motor of a hard disk drive to synchronize a motion of said rotary positioner with a motion of said head arm so that an output from said displacement detection apparatus becomes constant as a position of said rotary positioner varies.

11. (Previously Presented) A rotary encoder comprising:

a displacement detection apparatus comprising:

a light beam illuminating system that converts a linearly polarized light beam emitted from a light emitting element into a substantially parallel light beam;

a light beam splitting optical system that splits the single parallel light beam emerging from said light beam illuminating system into a plurality of polarized light beams having different polarized states;

a focusing optical system that focuses the plurality of split light beams to different positions which are spatially separated from one another on a surface of a relatively moving object;

a polarizing prism that splits reflected light beams from the relatively moving object on the basis of a difference between the plurality of directions of polarization, wherein said reflected light beams are matched by said light beam splitting optical system;

a plurality of light receiving optical systems that individually detect the different polarized light beams split by said polarizing prism and output light receiving signals of the respective light beams; and

a comparator that compares light receiving signal levels of the respective light beams to detect a relative displacement of the relatively moving object,

wherein a slit-shaped marking or a three-dimensional marking is formed on the surface of the relatively moving object to generate a reflectance difference;

wherein the slit-shaped marking or reflectance boundary portion is formed on a rotary disk surface; and

wherein said displacement detection apparatus is provided on a fixed object side to receive the plurality of reflected light beams from the marking or reflectance boundary portion on a moving scale and to detect a scale origin from a difference signal between the plurality of light receiving signals.

12. (Previously Presented) A linear encoder comprising:

a displacement detection apparatus of comprising:

a light beam illuminating system that converts a linearly polarized light beam emitted from a light emitting element into a substantially parallel light beam;

a light beam splitting optical system that splits the single parallel light beam emerging from said light beam illuminating system into a plurality of polarized light beams having different polarized states;

a focusing optical system that focuses the plurality of split light beams to different positions which are spatially separated from one another on a surface of a relatively moving object;

a polarizing prism that splits reflected light beams from the relatively moving object on the basis of a difference between the plurality of directions of polarization, wherein said reflected light beams are matched by said light beam splitting optical system;

a plurality of light receiving optical systems that individually detect the different polarized light beams split by said polarizing prism and output light receiving signals of the respective light beams; and

a comparator that compares light receiving signal levels of the respective light beams to detect a relative displacement of the relatively moving object,

wherein a slit-shaped marking or a three-dimensional marking is formed on the surface of the relatively moving object to generate a reflectance difference;

wherein the slit-shaped marking or reflectance boundary portion is formed on a linear encoder scale surface, and

wherein said displacement detection apparatus is provided on a moving object side to receive the plurality of reflected light beams from the marking or reflectance boundary portion on the linear encoder scale and to detect a scale origin from a difference signal between the plurality of light receiving signals.

13. (Previously Presented) A magnetic recording apparatus comprising:

a displacement detection apparatus comprising:

a light beam illuminating system that converts a linearly polarized light beam emitted from a light emitting element into a substantially parallel light beam;

a light beam splitting optical system that splits the single parallel light beam emerging from said light beam illuminating system into a plurality of polarized light beams having different polarized states;

a focusing optical system that focuses the plurality of split light beams to different positions which are spatially separated from one another on a surface of a relatively moving object;

a polarizing prism that splits reflected light beams from the relatively moving object on the basis of a difference between the plurality of directions of

polarization, wherein said reflected light beams are matched by said light beam splitting optical system;

a plurality of light receiving optical systems that individually detect the different polarized light beams split by said polarizing prism and output light receiving signals of the respective light beams; and

a comparator that compares light receiving signal levels of the respective light beams to detect a relative displacement of the relatively moving object,

wherein a boundary portion is formed on the surface of the relatively moving object to generate a reflectance difference;

a head arm having the marking or reflectance boundary portion formed on an upper surface;

a rotary positioner having said displacement detection apparatus on a rotary arm; and

a head arm drive motor control unit that controls a current of a head arm drive motor of a hard disk drive to synchronize a motion of said rotary positioner with a motion of said head arm so that an output from said displacement detection apparatus becomes constant as a position of said rotary positioner varies.

14. (Currently Amended) A rotary encoder comprising:

a displacement detection apparatus comprising:

a light beam illuminating system that converts a linearly polarized light beam emitted from a light emitting element into a substantially parallel light beam;

a light beam splitting optical system that splits the single parallel light beam emerging from said light beam illuminating system into a plurality of polarized light beams having different polarized states;

a focusing optical system that focuses the plurality of split light beams to different positions which are spatially separated from one another on a surface of a relatively moving object;

a polarizing prism that splits reflected light beams from the relatively moving object on the basis of a difference between the plurality of directions of polarization, wherein said reflected light beams are matched by said light beam splitting optical system;

a plurality of light receiving optical systems that individually detect the different polarized light beams split by said polarizing prism and output light receiving signals of the respective light beams; and

a comparator that compares light receiving signal levels of the respective light beams to detect a relative displacement of the relatively moving object,

wherein a boundary portion is formed on the surface of the relatively moving object to generate a reflectance difference;

wherein ~~the~~ a slit-shaped marking or reflectance boundary portion is formed on a rotary disk surface, and

wherein said displacement detection apparatus is provided on a fixed object side to receive the plurality of reflected light beams from the marking or reflectance boundary portion on a moving scale and to detect a scale origin from a difference signal between the plurality of light receiving signals.

15. (Currently Amended) A linear encoder comprising:

a displacement detection apparatus comprising:

a light beam illuminating system that converts a linearly polarized light beam emitted from a light emitting element into a substantially parallel light beam;

a light beam splitting optical system that splits the single parallel light beam emerging from said light beam illuminating system into a plurality of polarized light beams having different polarized states;

a focusing optical system that focuses the plurality of split light beams to different positions which are spatially separated from one another on a surface of a relatively moving object;

a polarizing prism that splits reflected light beams from the relatively moving object on the basis of a difference between the plurality of directions of polarization, wherein said reflected light beams are matched by said light beam splitting optical system;

a plurality of light receiving optical systems that individually detect the different polarized light beams split by said polarizing prism and output light receiving signals of the respective light beams; and

a comparator that compares light receiving signal levels of the respective light beams to detect a relative displacement of the relatively moving object,

wherein a boundary portion is formed on the surface of the relatively moving object to generate a reflectance difference;

wherein ~~the~~ a slit-shaped marking or reflectance boundary portion is formed on a linear encoder scale surface, and

wherein said displacement detection apparatus is provided on a moving object side to receive the plurality of reflected light beams from the marking or reflectance boundary portion on the linear encoder scale and to detect a scale origin from a difference signal between the plurality of light receiving signals.

16. - 20. (Cancelled)

21. (New) A displacement detection apparatus comprising:

an illuminating system that emits a light beam;

an optical system that splits the emitted light beam from said illuminating system into a plurality of polarized light beams having different polarized states and being focused on different positions on a surface of a relatively moving object, and that superposes the polarized light beams reflected from said surface of the relatively moving object;

a polarizing beam splitter that splits the superposed light beams into a plurality of light beams based on a difference of the polarization direction in relation to said different polarized states; and,

a displacement detection circuit that detects a relative displacement of the relatively moving object based on the light beams split by the polarizing beam splitter.

22. (New) A displacement detection apparatus according to Claim 21, wherein the illuminating system includes a light emitting element which emits a linearly polarized light beam, and an optical element which converts a light beam into a substantially parallel light beam.

23. (New) A displacement detection apparatus according to Claim 21, wherein the optical system includes a quartz plate which splits the parallel light beam from said illuminating system into a plurality of polarized light beams.

24. (New) A displacement detection apparatus according to Claim 21, further comprising a plurality of light receiving optical systems that individually detect the different polarized light beams split by said polarizing splitter and that output signals corresponding to the respective light beams; and

a comparator that compares said signals to detect a relative displacement of the relatively moving object.

25. (New) A displacement detection apparatus according to Claim 21, wherein the polarizing beam splitter is polarizing prism.

26. (New) A displacement detection apparatus according to Claim 21, wherein the polarizing beam splitter is a plurality of polarizing plates each of which having a polarizing direction different from the others.

27. (New) A magnetic recording apparatus comprising:

a displacement detection apparatus comprising:

an illuminating system that emits a light beam;

an optical system that splits the emitted light beam from said illuminating system into a plurality of polarized light beams having different polarized states and being focused on different positions on a surface of a relatively moving object, and that superposes the polarized light beams reflected from said surface of the relatively moving object;

a polarizing beam splitter that splits the superposed light beams into a plurality of light beams based on a difference of the polarization direction in relation to said different polarized states; and,

a displacement detection circuit that detects a relative displacement of the relatively moving object based on the light beams split by the polarizing beam splitter,

wherein a slit-shaped marking or a three-dimensional marking is formed on the surface of the relatively moving object to generate a reflectance difference;

a head arm having the marking or reflectance boundary portion formed on an upper surface;

a rotary positioner having said displacement detection apparatus provided on a rotary arm; and

a head arm drive motor control unit that controls a current of a head arm drive motor of a hard disk drive to synchronize a motion of said rotary positioner with a motion of said head arm so that an output from said displacement detection apparatus becomes constant as a position of said rotary positioner varies.

28. (New) A rotary encoder comprising:

a displacement detection apparatus comprising:

an illuminating system that emits a light beam;

an optical system that splits the emitted light beam from said illuminating system into a plurality of polarized light beams having different polarized states and being focused on different positions on a surface of a relatively moving object, and that superposes the polarized light beams reflected from said surface of the relatively moving object;

a polarizing beam splitter that splits the superposed light beams into a plurality of light beams based on a difference of the polarization direction in relation to said different polarized states; and,

a displacement detection circuit that detects a relative displacement of the relatively moving object based on the light beams split by the polarizing beam splitter,

wherein a slit-shaped marking or a three-dimensional marking is formed on the surface of the relatively moving object to generate a reflectance difference;

wherein the slit-shaped marking or reflectance boundary portion is formed on a rotary disk surface; and

wherein said displacement detection apparatus is provided on a fixed object side to receive the plurality of reflected light beams from the marking or reflectance boundary portion on a moving scale and to detect a scale origin from a difference signal between the plurality of light receiving signals.

29. (New) A linear encoder comprising:

a displacement detection apparatus of comprising:

an illuminating system that emits a light beam;

an optical system that splits the emitted light beam from said illuminating system into a plurality of polarized light beams having different polarized states and being focused on different positions on a surface of a relatively moving object, and that superposes the polarized light beams reflected from said surface of the relatively moving object;

a polarizing beam splitter that splits the superposed light beams into a plurality of light beams based on a difference of the polarization direction in relation to said different polarized states; and,

a displacement detection circuit that detects a relative displacement of the relatively moving object based on the light beams split by the polarizing beam splitter,

wherein a slit-shaped marking or a three-dimensional marking is formed on the surface of the relatively moving object to generate a reflectance difference;

wherein the slit-shaped marking or reflectance boundary portion is formed on a linear encoder scale surface, and

wherein said displacement detection apparatus is provided on a moving object side to receive the plurality of reflected light beams from the marking or reflectance boundary portion on the linear encoder scale and to detect a scale origin from a difference signal between the plurality of light receiving signals.

30. (New) A magnetic recording apparatus comprising:

a displacement detection apparatus comprising:

an illuminating system that emits a light beam;

an optical system that splits the emitted light beam from said illuminating system into a plurality of polarized light beams having different polarized states and being focused on different positions on a surface of a relatively moving object, and that superposes the polarized light beams reflected from said surface of the relatively moving object;

a polarizing beam splitter that splits the superposed light beams into a plurality of light beams based on a difference of the polarization direction in relation to said different polarized states; and,

a displacement detection circuit that detects a relative displacement of the relatively moving object based on the light beams split by the polarizing beam splitter,

wherein a boundary portion is formed on the surface of the relatively moving object to generate a reflectance difference;

a head arm having the marking or reflectance boundary portion formed on an upper surface;

a rotary positioner having said displacement detection apparatus provided on a rotary arm; and

a head arm drive motor control unit that controls a current of a head arm drive motor of a hard disk drive to synchronize a motion of said rotary positioner with a motion of said head arm so that an output from said displacement detection apparatus becomes constant as a position of said rotary positioner varies.

31. (New) A rotary encoder comprising:

a displacement detection apparatus comprising:

an illuminating system that emits a light beam;

an optical system that splits the emitted light beam from said illuminating system into a plurality of polarized light beams having different polarized states and being focused on different positions on a surface of a relatively moving object, and that superposes the polarized light beams reflected from said surface of the relatively moving object;

a polarizing beam splitter that splits the superposed light beams into a plurality of light beams based on a difference of the polarization direction in relation to said different polarized states; and,

a displacement detection circuit that detects a relative displacement of the relatively moving object based on the light beams split by the polarizing beam splitter,

wherein a boundary portion is formed on the surface of the relatively moving object to generate a reflectance difference;

wherein a slit-shaped marking or reflectance boundary portion is formed on a rotary disk surface, and

wherein said displacement detection apparatus is provided on a fixed object side to receive the plurality of reflected light beams from the marking or reflectance boundary portion on a moving scale and to detect a scale origin from a difference signal between the plurality of light receiving signals.

32. (New) A linear encoder comprising:

a displacement detection apparatus comprising:

an illuminating system that emits a light beam;

an optical system that splits the emitted light beam from said illuminating system into a plurality of polarized light beams having different polarized states and being focused on different positions on a surface of a relatively moving object, and that

superposes the polarized light beams reflected from said surface of the relatively moving object;

a polarizing beam splitter that splits the superposed light beams into a plurality of light beams based on a difference of the polarization direction in relation to said different polarized states; and,

a displacement detection circuit that detects a relative displacement of the relatively moving object based on the light beams split by the polarizing beam splitter,

wherein a boundary portion is formed on the surface of the relatively moving object to generate a reflectance difference;

wherein a slit-shaped marking or reflectance boundary portion is formed on a linear encoder scale surface, and

wherein said displacement detection apparatus is provided on a moving object side to receive the plurality of reflected light beams from the marking or reflectance boundary portion on the linear encoder scale and to detect a scale origin from a difference signal between the plurality of light receiving signals.